



(RESEARCH ARTICLE)



## The prevalence of Rheumatoid arthritis on female patients of child-bearing age at University of Port Harcourt Teaching Hospital, Rivers State, Nigeria

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### Abstract

Rheumatoid arthritis (RA) is the most commonly diagnosed systemic inflammatory disease that can affect multiple joints of the body. RA affects women 2-3 times more than men. Pregnancy has been reported to have an ameliorating effect on the course of existing RA and the flare-up of disease activity in the postpartum period. This study was carried out on two hundred and forty (240) female patients of child bearing age after obtaining an ethical approval from the Ethical Committee of University of Port Harcourt Teaching Hospital. 5ml of blood samples were drawn from the ante-cubital fossa of each woman with 5ml syringe and needle, between 8am to 11am each day. The samples were sent to the laboratory for analysis. The Latex Slide Test kit used for the serological analysis contains both the positive and negative control. The result obtained was compared with both the positive and negative control. Twelve (12) of the samples tested positive for the Rheumatoid Factor during the qualitative analysis, while the remaining two hundred and twenty-eight (228) tested negative. All positive results from the qualitative analysis tested positive when the test control was carried out, likewise the negative results which were all negative for the test control. The prevalence of rheumatoid arthritis in female patients of child bearing age for this study was calculated to be 5% which was 4% higher than the world prevalence, estimated to be 1%. The relevance of this study was to ascertain the occurrence of rheumatoid arthritis in female patients of child bearing age, which would serve as a useful tool in other rheumatoid arthritis prevalence studies that could be directed towards a better understanding of the flare of the disease and for the development of a more effective preventive and curative therapy.

**Keywords:** Arthritis; Rheumatoid; Joint; Systemic; Disease

### 1. Introduction

Rheumatoid arthritis is a chronic inflammatory disease state characterized by bone and joint erosion, which can manifest in the patient as joint pain, stiffness and fatigue. Patients with rheumatoid arthritis are at risk of other health complications such as anaemia, osteoporosis, depression, pulmonary, psychological, and skeletal disorders[1].

Rheumatoid arthritis is a common autoimmune disease that is associated with progressive disability, systemic complications, early death, and socioeconomic costs [2]. Rheumatoid arthritis, the most common form of chronic inflammatory polyarthritis, represents a significant health burden to the developed world. The word arthritis means inflammation of the joint (“arthro” meaning joint and “itis” meaning inflammation). Inflammation is a medical term describing pain, stiffness, redness, and swelling. Rheumatoid arthritis is characterized by synovial inflammation and hyperplasia, autoantibodies production (rheumatoid factor and anti-citrullinated peptide/protein antibodies [ACPA]), and cartilage and bone destruction. Numerous lines of evidence support the potential contribution of fibroblast-like synoviocytes (FLSs) to the pathogenesis of chronic arthritis[3]. Rheumatoid arthritis is believed to be the result of a

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malfunctioning immune system, although its cause is still unknown. However, it is said to be caused by combination of the following; genetics that is, rheumatoid arthritis is hereditary, environmental factor, hormones and abnormal immunity are all. Among environmental factors, smoking has by far the strongest association with RA. Smoking increases susceptibility to RA and adversely affects the clinical course of the disease, as shown by cross sectional and longitudinal studies[4].

Symptoms of rheumatoid arthritis includes; pain, swelling, stiffness in more than one joint, symmetrical joint involvement, a general feeling of being unwell, joint deformity, fever, unsteadiness when walking, weight loss, loss of function and mobility and general body weakness[5].

Rheumatoid arthritis has been said to affect more than 1.3 million people in the United States, usually seen in people in the age range of between 20 to 50, but can be developed in young children and elderly. It has also been reported that RA affects approximately 0.5 to 1% of adult population of developed regions[6]. The risk factors of rheumatoid arthritis have been associated with the female sex, although sex differential is less prominent in older patients[7]. Although some patients have mild self-limited disease, many experience joint destruction, severe physical disability and multiple comorbidities[8]. Urbanization has been associated with an increased prevalence of RA. For example, in the Xhosa tribe of South Africa, the prevalence of RA is higher among individuals living in an urban rather than a rural environment. Similar findings have been obtained in urban, suburban, and rural populations in Taiwan[9]. These results suggest that environmental factors may affect RA susceptibility in individuals who share the same genetic background. Pregnancy often causes rheumatoid arthritis remission, likely because of immunologic tolerance[10]. It is worthy of note that breastfeeding decreases the risk of rheumatoid arthritis, whereas early menarche and irregular menstrual period increases the risk[11].

Few complications have been reported with the use of acupuncture for RA[5]. Results of randomized controlled trials support physical exercise to improve quality of life and muscle strength in patients with RA[12]. Exercise training programs have also not been shown to have deleterious effects on RA disease activity, pain scores, or radiographic joint damage[13]. Randomized controlled trials of Iyengar yoga in young adults with RA are been used[14].

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## 2. Material and methods

Ethical approval was first obtained from the University of Port Harcourt Ethical Committee before the commencement of the study. Informed consent was sought and obtained from each patient prior to collection of the blood samples. 5mls of blood were collected from each of the female patients between 8:00am and 11:00 am each day. While in the sitting position, the tourniquet was applied on the upper arm. The usual precaution of selecting an easily accessible vein in the anti-cubital fossa and applying the minimum of venous stasis was observed. The anterior surface of the forearm of the patient was cleaned with alcohol swab. The most prominent vein was located and 5ml of venous blood drawn with a plastic disposable syringe. The blood samples were dispensed into plain sample bottles and labeled. The serum from the samples were then tested for serological biomarkers through the rheumatoid arthritis test procedure. Qualitative test was conducted as the reagents and specimens were brought to room temperature before use, one drop of the RF Positive Control was placed on the field #1 of the reaction slide. One drop of the RF Negative Control was placed on field #2. The remaining fields were used for test specimens. The pipette provided was used to place one drop of the undiluted specimens on successive fields. The Stir Sticks were retained for the mixing steps. The RF Latex Reagent was gently re-suspended and one drop added to each test field. The Stir Sticks were used to spread reaction mixture over the entire test field.

The slide was rotated manually and read immediately under direct light within three minutes.

Presence of agglutination of the latex particle was taken a positive result. Agglutination indicates a RF concentration of equal or more than 8 $\mu$ l/ ml. Sera with positive agglutination were evaluated again with the Quantitative test. For the quantitative test, the reagents and specimens were brought to room temperature before use. The Glycine-Saline buffer was used to dilute the specimens into a ratio of 1:2, 1:4, 1:8, 1:16, 1:32, as needed. One drop of both the negative and positive controls was placed on two slide rings. One drop of each dilution was placed on successive fields of the reaction slide. The RF Latex Reagent was gently re-suspended and one added drop to the reaction slide. The RF Latex Reagent was gently re-suspended and one added drop to each test field. The Stir Sticks were used to spread reaction mixture over the entire field.

The slide was rotated for two minutes and read immediately under direct light. RF Positive and Negative Control were included in each test batch. Acceptable performance was indicated when a uniform milky suspension with no agglutination was observed with the RF Negative Control and agglutination with large aggregates was observed with

RF Positive Control which served as quality control of the test. All the samples followed the same procedure as seen in the qualitative test above.

### 3. Results

A negative reaction was indicated by a uniform milky suspension with no agglutination observed with the RF Negative Control, while a positive reaction was indicated by any observable agglutination reaction. The specimen reaction was compared to the RF negative and positive controls. So also, the titer of the serum was the reciprocal of the highest dilution, which exhibited a positive reaction. Data obtained from the laboratory test results and the questionnaire findings were also reported.

**Table 1** Results of the screening test for Rheumatoid Arthritis

Study groups	Test	Result
1-20	-	-
21-40	-	++
41-60	-	-
61-80	-	+
81-100	-	+
101-120	-	+
121-140	-	++
141-160	-	-
161-180	-	++
181-200	-	-
201-220	-	+
221-240	-	++

In the above table, - represent a negative result while + represent positive results

**Table 2** Study Results of Test Kit Method for RA in 240 of Child-bearing female patient samples

Study groups	Positive control	Negative control	Test result
1-20	+	-	-
21-40	+	-	++
41-60	+	-	-
61-80	+	-	+
81-100	+	-	+
101-120	+	-	+
121-140	+	-	++
141-160	+	-	-
161-180	+	-	++
181-200	+	-	-
201-220	+	-	+
221-240	+	-	++

In the above table, - represent a negative result while + represent positive results

#### 4. Mean age of patients

In order to obtain the mean age of the patients (20 – 50) years of age, a frequency distribution table was constructed using a class limit of three (3)

**Table 3** Age frequency distribution table of the subjects

Class interval (years)	Frequency (f)	X	Fx
20 – 23	22(9%)	22	484
23 – 26	46(19%)	25	1150
26 – 29	32(13%)	28	896
29 – 32	34(14%)	31	1054
32 – 35	38(16%)	34	1292
35 – 38	14(6%)	37	518
38 – 41	19(8%)	40	760
41 – 44	16(7%)	43	688
44 – 47	11(6%)	46	506
47 – 50	8(3%)	49	392
	240		7740

Arithmetic Mean (A.M) is given by the formula below:

$$A.M = \frac{\sum fx}{f}$$

$$\text{Since } \sum fx = 7740$$

$$A.M = \frac{7740}{240}$$

$$\therefore A.M = 32.25$$

Therefore, the mean age of the patients involved in the research is approximately 32 years.

**Table 4** Frequency distribution table for no of children of subjects

No of children	Frequency (f)
0	9(5%)
1	25 (7%)
3	60 (18%)
4	53 (30%)
5	53 (21%)
6	40 (18%)
	240

**Table 5** Occupation distribution of the child-bearing female patients

Occupation	Frequency (f)
Unemployed (single)	35 (6%)
Private Establishment	32 (20%)
Civil Servant	60 (29%)
Self Employed	70 (36%)
House Wife	43 (9%)
	240

## 5. Discussion

The main purpose of this study was to determine the prevalence of rheumatoid arthritis on female patients of child bearing age attending University of Port-Harcourt Teaching Hospital. The sample size was 240. The sample method adopted was the simple random sampling method.

After sample collection from University of Port-Harcourt Teaching Hospital, the serological evaluation was immediately carried out in a laboratory to avoid “lost” of the samples. There were 12 positive samples out of the 240 samples tested, with presence of agglutination, while the remaining 228 tested negative with no agglutination seen on the test slides. The same were observed in the test controls, all positive tested positive for the control test and all negative tested negative for the control test.

Most prevalence studies are presented in percentage. The prevalence in this study were calculated by the arithmetic step below:

$$\frac{\text{Number of Sample that tested positive}}{\text{sample size}} \times \frac{100}{1}$$

$$\text{i.e., } \frac{12}{240} \times \frac{100}{1} = 5\%$$

This figure is 4% greater than value of the world prevalence which was estimated to be 1%[15]. It is likewise lower than other previous researches such as the South African study that gave the prevalence of RA of Tswana of West Transvaal to be 0-1%[16], the Xhosa of the Transkei 0.68%, [17] and the Sothos in Lesotho 0.3%[18]. The possible reason for this greater prevalence could be as a result of the urbanization of Port Harcourt Metropolis. Urbanization, as previously stated in this work, has been associated with an increased prevalence of rheumatoid arthritis. For instance, in the Xhosa tribe of South Africa, the prevalence of RA is higher among individuals living in an urban rather than a rural environment[18]. Another possible reason for the higher prevalence of this study could be environmental factors such as pollutants, which increases the risk of developing RA. In a study [19] nested in the Nurse’s Health Study examined the distance between the place of residence in 2000 and the nearest road, which served as an indicator of exposure to traffic pollution. The required data were available for 90,297 nurses. The statistical models were adjusted for age, calendar year, race, cigarette smoking, parity, lactation, menopausal status and hormone use, oral contraceptive use, body mass index, physical activity, and census-tract-level median income and house value. Women living within 50 m of a road had an increased risk of RA, compared to women living 200 m or farther from a road. Thus, exposure to traffic pollution in adulthood may be a newly identified environmental risk factor for RA.

World variations in the prevalence of RA do exist, with low levels in Africa [20], Indonesia [21] and other developing countries [22]. Using the same simply random method, exceptionally low prevalence was reported in Nigeria as whole and Hong Kong [23].

The number of pregnant female patients in this study was one hundred and forty (140), this representing 58.3% of sample size. Only one of this category tested positive for RF factor. The low incidence in this group (pregnant female patients) could be explained by other previous studies. [24] Explained the beneficial effect of pregnancy on RA disease activity, including, for example, an increase in regulatory T cells. [25] Proposed a shift from Th1 to Th2 cells and [26] postulated a change in glycosylation of IgG. However, owing to the difficulty in performing a prospective study in

pregnant RA women, the majority of these studies are small and hence do not allow a comparison of patients with RA who improve during pregnancy with those who do not. Therefore, it can often not be concluded from these studies whether the observed changes only represent a general adaptation of the immune system during pregnancy or whether these changes are also responsible for the ameliorating effect of pregnancy on RA.

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## 6. Conclusion

Rheumatoid arthritis is the most common form of polyarthritis characterized by synovial inflammation and hyperplasia, autoantibodies production and associated with progressive disability, systemic complications, early death, and socioeconomic costs. It has a variety of symptoms such as pain and stiffness in multiple joints, decreased range of motion, fever, fatigue, weight loss or decreased appetite and nodules. The risk factors for rheumatoid arthritis include: family history (genetics), gender, age, environment and smoking. Different authorities have stated the effect of pregnancy, infertility, lactation of the progress of rheumatoid arthritis.

At the end of this study, it was found that there was a high prevalence (5%), of rheumatoid arthritis in female patients of child bearing age in the University of Port Harcourt Teaching Hospital. It was suggested that urbanization and environmental factors such as pollutants could be a contributing factor to this figure.

Colloquially termed as the *Christian mother's disease*, rheumatoid arthritis affects women 2-3 times more than men and is often associated with pain and disability. The relevance of this study was to ascertain the occurrence of rheumatoid arthritis in female patients of child bearing age which would serve as a useful tool in other rheumatoid arthritis prevalence studies that could be directed towards a better understanding of the flare of the disease or for the development of a more effective preventive and curative therapy.

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## Compliance with ethical standards

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### *Statement of ethical approval*

Ethical approval was obtained from the University of Port Harcourt Teaching Hospital ethics unit.

### *Statement of informed consent*

Informed consent was obtained from all the individuals involved in this study.

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## References

- [1] Iain B, Georg S. The Pathogenesis of Rheumatoid Arthritis. *New England journal of Medicine*. 2011; 365(23): 2205 - 2219.
- [2] Firestein GS. Evolving concepts of Rheumatoid Arthritis. *Nature*. 2003; 423: 356 – 61.
- [3] Huber LC, Distler O, Tarner I, Gay RE. Synovial fibroblasts: key players in Family Physicians Rheumatoid Arthritis, *Rheumatology*. 2006; 45(6): 669 - 675.
- [4] Costenbader KH, Joann EM. Do Female Hormone affect the onset or severity of Rheumatoid Athritis? *Arthritis Care and Research*. 2008; 59(3): 299 – 301.
- [5] The Arthritis Society. Rheumatoid arthritis: Causes, Symptoms and Treatment. 2005.
- [6] Carbonell J, Cobo T, Balsa A, Descalzo MA, Carmona L. The incidence of rheumatoid arthritis in Spain: results from a nationwide primary care registry. *Rheumatology*. 2008; 47(7): 1088-1092.
- [7] Firestein GS, Kelly WN. Etiology and pathogenesis of rheumatoid arthritis: Kelly's textbook of Rheumtology. 8th edition. Philadelphia. 2009.
- [8] Plenge RM. Rheumatoid Arthritis Genetics: 2009 update. *Curr Rheumatol Rep*. 2009; 11(5): 351-6.

- [9] Chou CT, Pei L, Chang DM, Lee CF, Schumacher HR, Liang MH. Prevalence of rheumatic diseases in Taiwan: a population study of urban, suburban, rural differences. *J Rheumatol*. 1994; 21(2): 302–6.
- [10] Kaaja RJ, Greer IA. Manifestation of chronic disease during pregnancy. *JAMA*. 2005; 294(21): 2751- 2757.
- [11] Karlson EW, Mandl LAH, Grodstein F. Do breastfeeding and other reproductive factors influence future risk of rheumatoid arthritis? Results from the Nurses' Health Study. *Arthritis & Rheumatism*. 2004; 50(11): 3458 – 3467.
- [12] Baillet A, Payraud E, Niderprim VA. A dynamic Exercise Programme to improve Patients' Disability in Rheumatoid Arthritis: a prospective randomized controlled trial. *Rheumatology (Oxford)*. 2009; 48(4): 410-415.
- [13] Hurkmans E, van der Giesen FJ, Vliet- Vlieland TP. Dynamic Exercise programs (aerobic capacity and/or muscle strength training) in patients with rheumatoid arthritis. *Cochrane Database Syst Rev*. 2009; (4): CD006853.
- [14] Evans S, Cousins L, Tsao JC. A Randomized Controlled Trial Examining Iyengar Yoga for young adults with Rheumatoid Arthritis. *Trials*. 2011; 12: 19.
- [15] Jane W, Anne B, Sally L. The Epidemiology of Rheumatoid Arthritis and the use linkage and association studies to identify disease genes. *The Hereditary Basis of Rheumatic Diseases*. 2006; 9 – 28.
- [16] Beighton P, Solomon L, Valkenburg H. A. Rheumatoid arthritis in a rural South African Negro population. *Ann Rheum Dis*. 1975; 34(2): 136 – 141.
- [17] Meyers OL, Daynes G, Beighton P. Rheumatoid arthritis in a tribal Xhosa population in the Transkei, Southern Africa. *Ann Rheum Dis*. 1977; 36(1): 62-5.
- [18] Moolenburg JD, Valkenburg HA, Fourie PB. A population study on rheumatoid arthritis in Lesotho, Southern Africa. *Ann Rheum Dis*. 1986; 45: 691-5.
- [19] Hart JE, Laden F, Puett RC, Costenbader KH, Karlson EW. Exposure to traffic pollution and increased risk of rheumatoid arthritis. *Environ Health Perspective*. 2009; 117(7): 1065–9.
- [20] McGill P. Rheumatoid arthritis in sub-Saharan Africa. *Ann Rheum Dis*. 1991; 50(12): 965 – 6.
- [21] Darmawan J, Muirden K, Valkenburg H, Wigley R. The epidemiology of rheumatoid arthritis in Indonesia. *Br J Rheumatol*. 1993; 32(7): 537- 40.
- [22] Mendez- Bryan R, Gonzales-Alcover R, Roger L. Rheumatoid Arthritis: Prevalence in a Tropical Area. *Arthritis Rheum*. 1996; 7(4):171- 6.
- [23] Lau E, Symmons D, Bankhead C, MacGregor A, Donnan S, Silman A. Low prevalence of rheumatoid arthritis in the urbanized Chinese of Hong Kong. *J Rheumatol*. 1993; 20(7): 1133–1137.
- [24] Roger VL, Kimberly PL, Elena M, Cynthia SC, John MD, Barry LK, Daniel DB, Terry MT, Richard JR, Sherine EG. Increased prevalence of diastolic dysfunction in Rheumatoid Arthritis. *Annal of the Rheumatoid Disease*. 2010; 69(9): 1665 – 1670.
- [25] Munoz-Valle JF, Vazquez-del M, Garcia-Iglesias T, Orozco-Barocio G, Bernard-Medina G, Martinez-Bonilla G, Bastidas-Ramirez BE, Navarro AD, Bueno M, Martinez-Lopez, Best-Aguilera CR, Kamachi M, Armendariz-Borunda J. T<sub>H</sub>1/T<sub>H</sub>2 Cytokine Profile, metalloprotease-9 activity and hormonal status in pregnant Rheumatoid Arthritis and Systemic Lupus Erythematosus Patients. *Clinical & Experimental Immunology*. 2003; 131(2): 337 -384.
- [26] Alavi A, Arden N, Spector TD, Axford JS. Immunoglobulin G glycosylation and clinical outcome in Rheumatoid Arthritis during Pregnancy. *The Journal of rheumatology*. 2000; 27(6): 1379 – 1385.